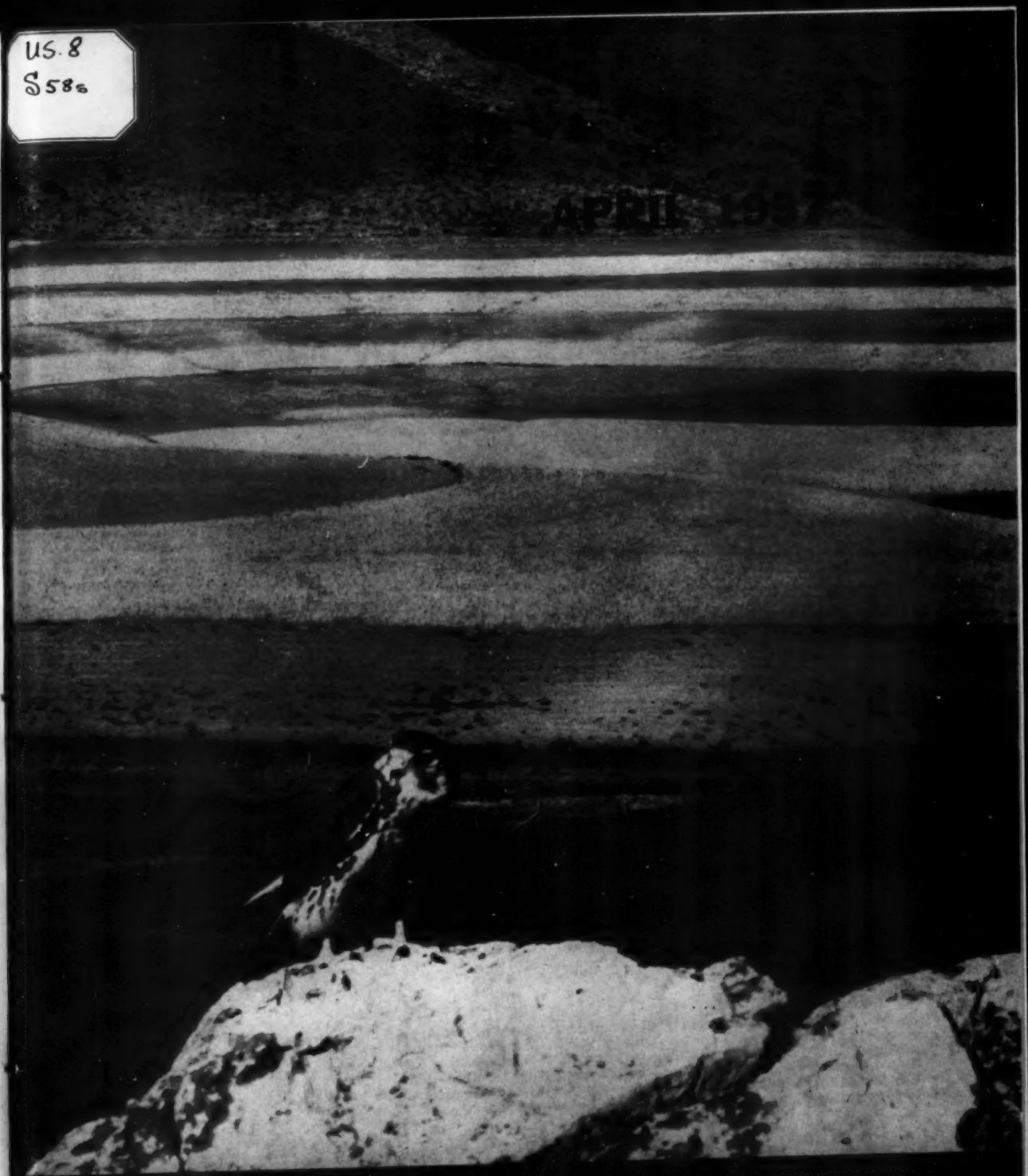


SOIL CONSERVATION

Soil Conservation Service • U. S. Department of Agriculture

APRIL—1957
VOL. XXII—NO. 9

SOIL CONSERVATION

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

15 CENTS PER COPY $1.25 PER YEAR

FOREIGN—$1.75 PER YEAR

25 percent discount on orders of 100 or more subscriptions mailed to a single address

CRABGRASS CONTROL.—Excellent results in crabgrass control on lawns through chemicals was recently reported by horticulturists R. B. Taylorson, R. C. Room, and M. N. Dana of the University of Wisconsin. They claim the best results from use of NPA (naphthyl phthalmic acid).

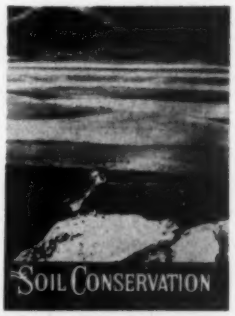
Two applications at about the time crabgrass seeds were germinating last year gave very good control with little injury to desirable grasses. Application time was late May and early June. Rates were around one-fourth pound of active chemical per 1,000 square feet of lawn.

There's a chance for crabgrass control with one application if timed properly, the scientists feel.

Another promising treatment was Standard Spray C (an oil), plus a chemical called MAA (methyl arsonic acid). However, there's some danger of injury with this treatment and further experiments are needed to prove its worth.

In these tests, a widely used material called PMA was not successful. MAA alone also gave poor crabgrass control, the researchers said.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Wild prairie falcon surveys the terrain of the Portneuf Soil Conservation District in Idaho.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Independence at Littleton Common

A conservationist explains how saving soil means independence for the farmers of his community.

By BERNARD A. ROTH

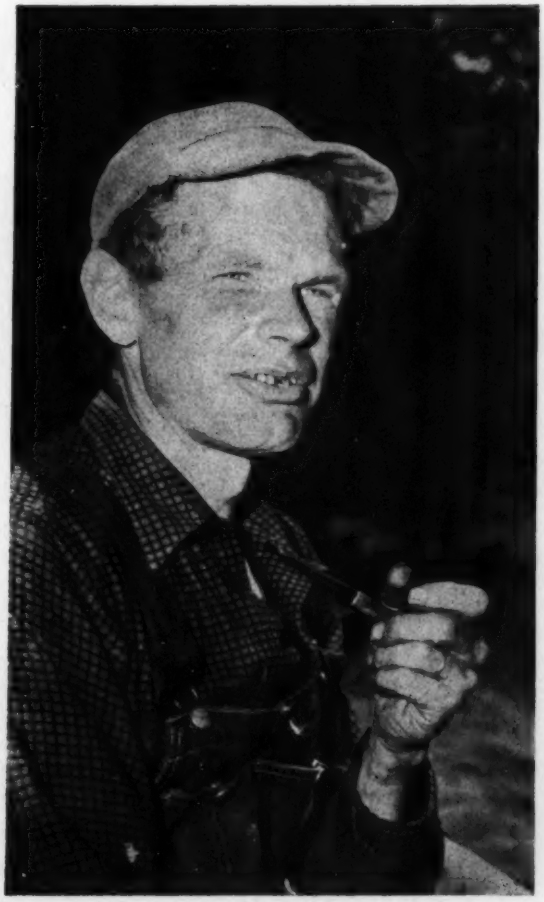
"THAT used to be brush, wire grass, and moss, and now look at it!" Bob Stuart pointed to a 5-acre patch of meadow knee deep in alfalfa and bromegrass. "In the old days, 500 pounds of hay was a big take for that knoll. Right now, we're cutting better than 4 tons to the acre, sometimes 3 cuttings a season." The New Englander made a sweeping gesture that included the rest of the meadowland across the road from his 200-year-old farmstead.

When Robert E. Stuart, of Littleton Common, Mass., talks about soil conservation farming, people stop and listen. He makes it sound as practical as an ax handle. And that's just the way he looks at it, having had 10 years' leadership in the Middlesex County Soil Conservation District. He's been chairman of supervisors much of the period. Recently he started a 5-year term on the State Soil Conservation Committee.

"Here in Middlesex," Stuart said, "we've taken up conservation as a lot of our ancestors did when they grabbed a musket and marched off to fight at the Old North Bridge. Practical, yes. But behind it all, I think, we're aiming straight at independence. Let me show you what I mean."

He did show us. It was a grand tour of 150 acres choicely used. The fields sparkled with new grasses, all installed since Bob took over in the late thirties—ladino clover and orchardgrass in the pastures, alfalfa and bromegrass for hay. A bed-drainage system was at work bringing new life to one meadow. A 600-foot diversion ditch was taking the sogginess out of a pasture. "We've got about a mile of open drains," commented Bob, "and nearly as much tile."

Where a strip of corn caught the sunlight, Bob explained, "There's our crop rotation—a year of grain and four of grass. It's a long one. Even so, we can grow enough grain for our cattle, except for the supplement. That is, we could if we didn't have the chickens to feed,



Robert E. Stuart.

Note.—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.

too. And, by the way, we have our own hammermill that serves us, and some of the neighbors, as well."

Stuart's 60-odd Holsteins munched contentedly near a stone wall along the roadside. Among them were beef animals destined for the Stuart larder—two Angus and three Hereford steers. Back of the big comfortable farmhouse, shaded by stately elms, were houses for 1,500 laying hens. "I'm on the truck every Friday," said Bob. "We *retail* 90 percent of our eggs and 75 percent of our poultry; but we wholesale all our milk."

From there, the trail led through 25 acres of clean-limbed woods fenced from the herd. "We farm the woodland, too," Bob explained when we noted the absence of "wolf" trees so common to the Northeast. We emerged into a vineyard that Bob described as his "plushest" acre. "They're Concords, Fredonias, Ontarios, Niagaras and Brightons—but the dark grapes are the best sellers. Stores take every last one we can produce. Too bad it takes so long to develop a vineyard," he concluded wistfully.

Back in the farmyard, Bob grinned when we pointed to a sign on the gatepost advertising "rotten manure." He explained it was a "little gold mine" his younger brother had located, in the foundation of an old barn. Packed in used fertilizer bags, it readily brought $1.25 per 50 to 75 pounds from suburban home gardeners, roundabout. "We don't believe in skimping our own soil treatment, either. We manure as heavily as we can. And, offhand, I'd say we use 50 tons of lime, 10 or 12 tons of commercial fertilizer, and about 3 tons of superphosphate a year."

Mention of his brother, reminded Bob to make it clear the farm was a joint enterprise shared by himself and James, and their families. Two other brothers had left the farm. Arthur, in the New England tradition, had gone to sea, attended Annapolis, and became a career officer in the Marines. Wallace was first secretary at the American Embassy in Uruguay.

"So you see how conservation has worked for

Beef steers and milk cows graze side-by-side on the Stuart farm.

us," went on Bob, as we sat in the cool, roomy kitchen. "It's given us a real variety of production that I think a family farm needs. If one end of the income goes down, we've always got something to balance it out. Sometimes the cows support the chickens. Another year it'll be the chickens' turn. So it goes. But I honestly believe if people would get just a little old-fashioned—diversify more—there'd be fewer ups and downs in agriculture."

Middlesex Soil Conservation District's record in the national soil conservation effort tends to support Bob's theories. It has been a steady leader in soil and water practices. Its books and affairs bear the stamp of smart business management. Farmers pay cash on the barrelhead for district equipment, services, and materials. Contractors seek its trade and readily pay a 5 percent fee for SCD job arranging. This year, the county won the Goodyear Soil Conservation Award for the second time.

What's the biggest challenge the district faces?

Bob's answer was ready and sincere: "I think it's to show our city folks the importance of soil conservation. I think we've got a great opportunity, now, with so many of them spilling over into the country. We need to convince them that this work is also theirs—part of a national obligation." He smiled reflectively. "Don't worry. We've got plans for them."

Pines For Profit

Many McCurtain County, Okla., farmers are planting pine seedlings instead of cotton and finding the new type of woodland farming more profitable.

By EARL J. HAYES

"ONLY God can make a tree." But, when a man plants a pine seedling he becomes a junior partner in growing a tree. If good forest-management practices are followed, the junior partner should find the enterprise profitable.

Joe Hough recently marked and sold pine from five 40-acre tracts on bids. He received $5,000 in cash and only 27 percent of the standing pine was removed.

"Say, that stuff is worth money!" Joe exclaimed, as he hurried away to plant some more. Hough has been cooperating with the Little River Soil Conservation District for 18 years, and is recognized as one of the best "tree farmers" in the district, according to Charles P. Burke, woodland conservationist, Soil Conservation Service, who is assisting the district.

None of our forefathers could have predicted that the sandy land, piney woods of south McCurtain County, Okla. would, in a relatively short time, change back from forest to farms to forest.

Thrifty young pines on the John McCloy farm in McCurtain County, Okla.

Note.—The author is work unit conservationist, Soil Conservation Service, Idabel, Okla.

The early farmers, around 1910, had good farm production as long as soil and plant food were present in adequate amounts. With declining yields and increased production costs a big percentage of these new farms became marginal within two decades. With depression prices in the early thirties, a high percentage of the farms became submarginal and tax delinquent; some were abandoned.

The area under discussion covers about 200,000 acres of forested coastal plain on which 600 farms were located in 1930. Today the same area has 300 farms. The living standard of these farmers has improved along with sound conservation concepts.

Now the big trend is pine! With Soil Conservation Service technicians working with the Little River Soil Conservation District a big change has come about. Since 1940, over 8,000 acres of land have been girdled or poisoned to release the interspersed pine for more rapid growth.

Pine planting has lately become relatively easy. The district supervisors have planting crews who operate on contract. With Agricultural Conservation Program financial cost-sharing, the expense to farmers is less.

"People owning pineland now," Dick Piner, Board Chairman, said recently, "are pulling their hats down and looking for adjoining land to buy."

By SCS land-capability survey standards this flat, undulating sandy land is most suited to timber. Row crops cause rapid soil deterioration, especially in this 47-inch rainfall belt. Soil conservation practices on cropland will maintain the soil and improve its productivity, but with less margins of profit than from pine trees.

Some people who were selling cutover pineland in 1940, on a low market, are now buying on a higher market. Yet, they have good reasons for expecting the investment to be sound.

Production records of pine on random selected 40-acre tracts from 1941 to 1957, show an average stumpage income of $14 per acre per year. Cotton on this land class never made people that happy. The county seat of Idabel had six cotton gins in 1935, today it has one.

The future of wood production and wood products looks solid in this area. The Little River SCD has led the turnabout from idle or cutover lands to sustained production of wood crops.

Over 80,000 acres of woodland, largely pine, is under agreement with the SCD. Technical woodland assistance is furnished to help owners who wish to do those things they are not trained to do. The technician does not do the job—he helps the landowner start it in an effective way.

(Continued on page 216)

Post yard at Idabel, Okla., where the first thinnings of local pine woodlands are cured and treated for market.

Sericea Lespedeza — Present and Future

No. 21

This is the twenty-first of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By PAUL R. HENSON

SERICEA lespedeza is probably the most important perennial legume for soil conservation and soil improvement in the South. In recent months the need for soil-improving plants in the Soil Bank Program has again focused attention on sericea in the southeastern states. Few if any soil-improving plants are available which, when established, can be maintained so cheaply over a period of years. There is less agreement on the value of sericea for pasture and hay. Experimental tests and farmers' experiences have demonstrated that on unfertilized, eroded, and infertile hillsides, sericea is lacking in palatability. It is reasonably palatable when managed properly and grown on better land or when fertilized.

In utilizing sericea for forage, it is recommended that grazing begin when the plant is 3- to 4-inches high. Manage the pasture either through numbers of animals or by mowing so that young tender shoots will be available for the grazing animals at all times. For hay, sericea is cut when it reaches a height of 10-14 inches, however, total yields of hay cut at the 10- to 14-inch height are less than yields at more mature stages. When sericea pastures are understocked and not mowed, the plants become tall and unpalatable, and in such pastures spot grazing frequently occurs late in the season.

Note.—The author is research agronomist, field crops research branch, Agricultural Research Service, Beltsville, Md.

Continuous close grazing or early mowing affect the productivity and longevity of stands of sericea. Since this species is an erect-growing plant, close continuous grazing or frequent mowing will tend to defoliate the plants, so that new growth is made, in part, at the expense of root reserves. The situation may be similar to that of alfalfa, except that alfalfa in the Southeast has the opportunity to recuperate during the late fall and early winter months—a period when sericea lespedeza is usually dormant. Information on the immediate effect of time of cutting sericea on root reserves is not available; however, limited tests have been conducted on the effect of various animal cutting treatments on yields and subsequent root growth and composition.

In 1936-37, unpublished data of work conducted under the supervision of the late A. J. Pieters, H. L. Hyland, and M. A. Hein in northern Virginia and Maryland, throw some light on the effect of different cutting treatments on subsequent root growth and composition. The cutting treatments were conducted on well-established stands of sericea in 1936. In the spring of 1937, before new growth had started, the sericea roots were dug from measured areas in the plots, and were weighed, dried, and analyzed to determine the effect of the different cutting treatments on root production and chemical composition. Analyses were made by H. L. Wilkins, research chemist.

In this study, frequent clipping from late May to late August greatly reduced root weights, the protein content of the roots, and the root reserves. This was the most severe cutting treatment tested.

Root production and the percent of protein and carbohydrates remaining in the roots were also greatly reduced in plots cut for hay in September, whether or not this cutting was the first, second, or third of the year. Total root weights and the composition of the roots in the spring, after plots had either been cut once or

twice for early hay, or cut only for seed, were not greatly different. There is some evidence to indicate that generally more vigorous roots resulted in plots where one early hay cutting was made.

At Statesville, N. C., in a study of time of cutting, R. E. Stitt found that stands of sericea, when cut at 2-week intervals up to September 22, were completely killed in one year.

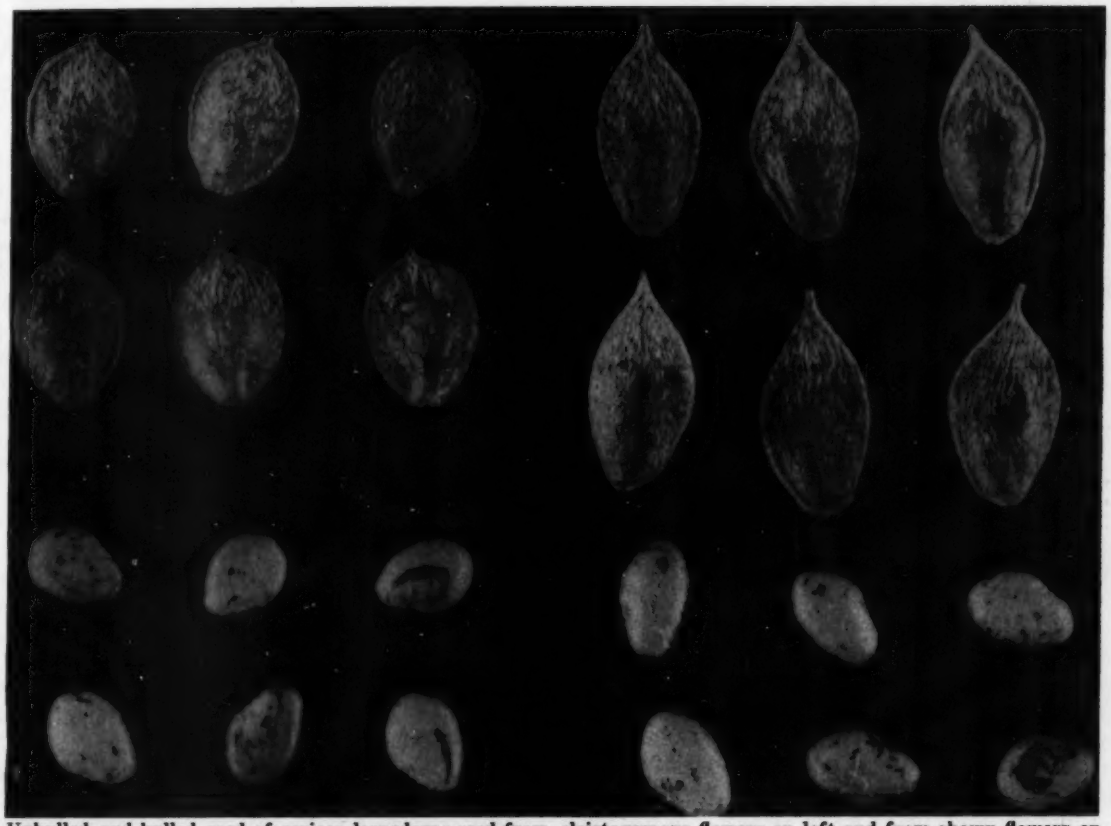
Reports of the effect of close grazing of sericea under experimental trials are lacking. At Beltsville, Md., in one grazing trial, steers grazed sericea lightly during the early part of the season but spot grazed areas in late summer. In these small areas the sericea was grazed to the ground by late fall. The areas were marked and recovery growth noted the following spring. Stands in the spot-grazed areas were reduced more than 80 percent and remaining plants were weak. It is possible that heavier fertilization would have reduced the severity of the damage from too frequent clipping and from overgrazing.

The results indicate that the constant utilization of sericea in early-growth stages, either for grazing or for hay, may not only shorten the life of sericea stands but result in lower forage yields. Reports of loss of stand of sericea have become more frequent in recent years. It is also evident that the present method of sericea management has arisen because sericea becomes less palatable in later growth stages. It is self-evident that the development of more palatable, productive varieties of sericea would increase pasture gains and ease grazing-management problems or permit greater hay yields through later cuttings.

What, then, are the possibilities of developing palatable, productive varieties of sericea lespedeza?

Research workers, over a period of years, have established certain facts with respect to the palatability and breeding behavior of the species. The high tannin content of the leaves and the coarseness of the stems are largely responsible for the low palatability. Heritable differences in tannin content and in coarseness of stems have been noted in the present breeding programs. The seed of sericea is produced from two types of flowers: the showy or normal flowers producing open-pollinated seed, which may be largely cross-pollinated; and the inconspicuous

Sericea pasture that was closely grazed the previous year. Light-colored areas were grazed so closely that most plants were killed.



Unhulled and hulled seed of sericea lespedeza: seed from cleistogamous flowers on left and from showy flowers on right (enlarged).

or cleistogamous flowers which are self-pollinated. Unhulled seed from the two flower types are easily distinguished, making it possible to maintain inbred lines of sericea simply by sorting out and planting only self-pollinated seed. From this information it would appear to be a simple job to develop superior sericea varieties.

Unfortunately, new evidence is accumulating to indicate that the lower tannin lines are reduced in vigor and productivity. Also, continued inbreeding reduces vigor in the species. While the plant breeders are hopeful that exceptions to these situations will be found, the final solution to the problem may rest in the development of new varieties through recombinations of desirable types in some form of strain building in which natural crossing will play an important part. If the latter procedure becomes necessary, then it will become important to produce seed of the new variety in areas where a high percentage of the seed is from showy, open-pollinated flowers in order to secure maximum cross-pollination. It is not now known where or under what conditions high percentages of seed from showy, open-pollinated flowers are produced. It is expected that the percentage of seed produced from open-pollinated flowers will vary, not only with seasonal conditions and the number of hay cuts taken, but also between northern and southern locations in the seed production area.

The problem is not insurmountable, but it is one requiring a coordinated approach by the plant breeders, the plant chemists, and the animal nutritionists, for its ultimate solution. Limited breeding programs are under way at various State experiment stations and in cooperative programs with the Department of Agriculture. While some progress is being made, the development of superior palatable varieties of sericea lespedeza is still a goal of the future.

Land Judging

Eighteen soil conservation districts in eastern Texas sponsored land judging contests in 1956, and more are expected to do so during coming years.

By REAGAN TAYLOR

DURING the 1955-56 school year more than 2,000 4-H Club boys and FFA boys participated in land judging contests in eastern Texas. The contests were sponsored by the supervisors of 18 East Texas soil conservation districts.

The sponsors requested and received cooperation from Federal and State agencies, the public school system, bankers, merchants, clubs, and churches to help train boys and assist in putting on the land judging contests. Cost in actual dollars was low. Individual and personal assistance and participation of people was high. This was a program in which everybody worked and everybody was happy with the results.

Many man-days of work are put into preparing for these contests long before they are held. Some school officials attend district board meetings to request assistance for boys in their schools. Many hours of training are required. Soil Conservation Service personnel, county agents, and vocational teachers gave most of the training.

The training given these boys may be divided into two parts. In part I, the students are taught how to classify soils. To classify soils a boy is taught how to consider and evaluate the following factors: Soil texture, permeability of the soil, soil depth, degree of slope, amount of erosion that has taken place, degree of wetness, and the present condition of the soil. The boys learn how to use their senses of touch, sight, taste, and smell in helping determine these factors. In learning to classify soils they also learn how to determine many things concerning the soils' capabilities. They find out that soil is more than "dirt".

Note.—The author is chairman of the board of supervisors, Shelby-Panola Soil Conservation District, Tex.

In part II, the boys are taught alternative treatments that can be applied to maintain or improve the soil—how to "dress it", and how to "keep it".

The training is given throughout the year in FFA classes and in 4-H Club meetings. It consists of classroom, or inside training, and on the ground field training. The students learn that there is a difference in soils—they act differently and they respond differently—when plowed, planted, or fertilized. They learn that some plants have a definite preference for certain soils, and that some plants build or improve soils while others tear them down. They learn WHY such things occur. They learn to fit plants to soils, and to select combinations of plants to use for developing cropping systems that will maintain and improve soils.

A land judging contest also requires a well-planned organization the day of the contest. The selection of the location for holding the contest is important. Sites to be judged must be accessible, close to each other, and related to each other.

The largest contest held in East Texas in 1956 was sponsored by the Shelby-Panola Soil Conservation District. Six hundred boys registered in this contest. In addition, 20 adults filled out

Winners of the 1956 Shelby-Panola land judging contest (left to right) Jack Johnson, Philip Aviola, Philip Weaver, and Rodney Edge.

A group of contestants in the 1956 Shelby-Panola land judging contest.

scorecards. Five sites representing kinds of soils and soil conditions were located within sight and hearing distance of the school. One person emceed the whole show.

Each site was considered a field and given a number. Each boy filled out a scorecard for each field. The contestants were divided into groups of 24 boys. A group leader—one of the coaches—was in charge of each group of contestants. A field leader, another coach, helped direct the groups from one field to another and also collected the scorecards. After each field was scored and the scorecards collected, they were sent to the schoolhouse to be graded. Another coach, acting as grader of scorecards, was assisted by 30 girls. Each card was graded and tabulated. Team scores were totaled and individual high scores noted. The emcee used a public address system, loaned by an oil company, to direct the moves and field operations of all groups from his centrally located position.

Implement dealers put on an implement-operation show. The food committee and water committee carried out their part in the program efficiently.

In this contest, 12 vocational-agriculture teachers, 3 county agents, 3 Agricultural Conservation Program Service office managers, 2 Farmers Home Administration representatives, and 4 Soil Conservation Service technicians participated. Also participating, were business people, bankers, equipment dealers, and industry representatives from the towns in the district. The Center radio farm program featured soil treatment and the land judging contest on their program for that day.

Soil conservation district supervisors were elated over the response and cooperation of everybody in this important undertaking.

Those who had contests in 1956 are planning and looking forward to bigger and better participation in land judging in 1957, and other districts have indicated their desire to follow suit. They realize that many of the boys who are trained now to judge land will be the farmers of tomorrow, and they want those farmers of the future to be prepared to carry out the Lord's wishes for the land: *To dress it and keep it.*

A subscription to this magazine should make an excellent contest prize.

Hawks and Eagles in Conservation

A soil conservationist and falconer discusses the place of raptorial birds in the soil, water, and wildlife conservation programs of soil conservation districts.

By MORLAN W. NELSON

SINCE man began to keep written records the raptorial birds, such as hawks and eagles, have been symbols of nobility. Their proud stance, courage, and noble nature were better appreciated in ancient times than now. Treatment of hawks and eagles has varied throughout history. During the days of the Mongol emperors in Asia and medieval noblemen of Europe the death penalty was given to a man having unauthorized possession of these birds! With the advent of gunpowder, hawks and eagles were shot with the same impunity that man destroyed vermin. Today, their important place in the scheme of nature is better understood, and they are beginning to get the protection they deserve.

The Department of Agriculture was one of the first organizations to recognize the useful role of raptorial birds in agricultural pursuits. Over 60 years ago the Department published a bulletin entitled "The Hawks and Owls of the United States in Their Relation to Agriculture." This bulletin points out that with rare exception these birds should be protected as useful because of their rodent-killing values.

Soil conservation districts have recently become allies of hawks and eagles. Many of the supervisors and cooperators in the districts

Note.—The author is a soil conservationist, Soil Conservation Service, Boise, Idaho. He is also a trainer of wild falcons and eagles.

Morlan W. Nelson and a golden eagle he has trained for hunting.

understand the agricultural role of the raptores. They also appreciate the esthetic value of seeing a rare hawk or eagle carrying on nature's intended work in the fields or on the range. It is common to hear them refer to hawks as "mousers," now, instead of "chicken hawks" as had been the case for so long. These men have taken the lead in the conservation of soil and water, and of wildlife too, including the raptorial birds.

New studies of the raptorial birds, although not yet conclusive, point out several things of practical significance. The fast hawks, such as the prairie falcon, that are capable of catching game birds, feed very heavily on ground squirrels, magpies, bull snakes, and other creatures that sometimes prey upon game birds and their eggs.

A family of falcons, for example, catches enough destructive reptiles and mammals each year to far outweigh the few game birds they may catch while hunting over an area. Also, adult game birds of a year or older seldom fall prey to hawks; they have learned the ways of all raptores and can evade the attacks.

Many farmers and sportsmen have told me of experiences with hawks in the field: "I was walking through a field and flushed a pheasant, but before I could shoot at it a hawk swooped down and struck it out of the air." This is an unnatural situation. Actually, any bird that stays in cover is safe from aerial predators. Freezing, in the slightest amount of cover, is the most effective way the smaller birds and game birds have of escaping attack by a falcon.

When birds are forced to fly—because someone has unintentionally flushed them when the falcon is overhead—the chances are good that the falcon will make a kill. Normally, no flight would occur while the falcon was near. Nature would never give the hawk the opportunity for such an easy chance at its quarry.

Falconers using trained hawks to hunt game, strive for the very situation that others have stumbled onto by accident. The situation is all to the predator's advantage and makes it possible to kill almost any bird that flies. Such observations have led to the general belief that fast hawks can catch their quarry with ease; but in nature the hawk probably misses 9 out of 10 attempts. Sometimes the hawk is killed by the evasive action of its quarry.

Norman Nelson and his trained prairie falcon.

Falcons climb to a high altitude, circle until quarry is spotted, then attack by falling with wings folded—making use of the force of gravity to gain terrific speed. As they approach their prey, they lower their tremendous feet and strike a death-dealing blow to their quarry. Their speed carries them on past, and if necessary, they fly back into the sky for a second attack. This characteristic has given the falcons the common name of "bullet hawk."

Birds and other animals hunted by the birds of prey use evasion tactics which gives them a more than 50-50 chance of escaping each attack. I have observed many such situations, but one of the most outstanding was an encounter between my trained peregrine falcon and a female pheasant. The falcon, which had been trained to hunt crows, was only halfway to her high position when she suddenly went into her dive at something on the ground. Usually one or two dives, or "stoops" as the falconer says, is all that is necessary, but the falcon continued to stoop at her grounded quarry.

Falconer training falcon with a lure.

In an effort to see what the hawk was attacking, I ran towards the point of her stoop. To my surprise, I saw a hen pheasant, apparently out in the open, defying her speedy attacker. There were tumble weeds, sage clumps, and grass cover all within 10 feet of this pheasant, yet it stayed in the open. Most birds would have immediately headed for cover and been perfectly safe from further attack, still, this one remained calmly waiting for possible death.

As the falcon started down in another stoop, I focused my field glasses on her and saw her zoom up sharply just before she got to the pheasant. There was a single strand of wire, the remains of an old fence, hanging about 1 foot above the ground. Had the hawk attempted to strike the pheasant, the hawk would have been killed by the wire just above it. While it is hard to say that the pheasant was actually trying to kill the predator, certainly it felt safe while underneath the wire.

Other birds and animals occasionally use cover in a similar manner, with the possibility of killing the attacker. Crows fly under three-wired farm fences for cover, and hop from side to side, always keeping the wires between them and the hawk. Magpies, pheasants, rabbits, and ducks will do the same when hard pressed by a hawk.

Most raptores have not only telescopic vision but have microscopic vision as well. But, the resourcefulness of wild game in evading aerial attack is greater than commonly thought. Even in almost hopeless situations they often come through in ways that are most effective. As an example of this type of quick action consider the following observation.

One day while hunting in Utah, I came across a large pasture that had just been irrigated. There was a very shallow pond in the lower end of the field where a lone mallard had alighted in search of food. The duck was walking in the shallow water but apparently did not want to fly because a large falcon was soaring a thousand feet in the air. If I continued to walk and the duck attempted to fly out under the circling hunter, it would most certainly be killed. I moved back into some dense cover and watched a tense drama develop. In a matter of seconds the falcon began her stoop, gathering speed as a falling stone. At that time, I would have given 100 to 1 odds that the duck's life was to end in less than 5 seconds. The mallard, however, was not to be finished so easily. As the falcon leveled out to strike, the duck beat its wings on the water. This action threw up a water spray that the hawk dared not strike against because of its speed. Each successive attack was met by the same defense until the frustrated predator decided to leave.

Of all the raptorial birds, the eagle is subject to some of the wildest of fictions. The exaggerations range from the early motion pictures that faked an eagle flying off with a baby, to a recent newspaper account of eagles in eastern Washington flying off with more than 50 lambs averaging 50 pounds each.

Prairie falcon with a magpie just captured.

The National Audubon Society has checked every story concerning babies carried off by eagles and found no actual cases on record. The eagles can and occasionally do kill lambs, but they cannot fly with anything weighing more than 8 pounds.

Also false are reports of eagles attacking humans who climb to their nesting sites. The smaller hawks, which are often mistaken for eagles and that do attack nest intruders with force, have given the eagle its reputation as a defender of the eyrie.

I have visited golden eagle nests in North Dakota, Wyoming, Colorado, New Mexico, Utah, Washington, Oregon, and Idaho and have never found the remains of a lamb, antelope, deer, mountain goat, or other large mammal. In all cases there were remains of jackrabbits, marmots, ground squirrels, prairie dogs, and occasionally sage hens. Also found were rattlesnakes, bull snakes, and other rare fauna.

The golden eagle is an intelligent bird. In training, it may challenge the falconer on occasion. But when properly handled and trained, it will hunt with the falconer, and will return on call from heights or distances far beyond the human eyes' scope of vision.

The feathered tarsus and dense body feathers of the golden eagle give protection against the coldest mountain or arctic weather. As a snow surveyor, I have often seen them on my long, lonely trips to remote mountain areas. My admiration rises each time for a bird that can make a living in the cold, harsh beauty of the mountains in winter. They sleep up there on those cold crags at temperatures that go down to more than 50° below zero.

Some day they may be understood by man, and at least a few allowed to live and greet those who venture to the tops of the mountains in winter or summer.

Already many of the ski resorts in western states know about the permanent residence of the golden eagle. Last year at the Snow Surveyors' School at Alta, Utah, one of these great birds hunted in the training area each day. This eagle actually made use of a beagle hound in his hunting. The dog, owned by one of the lodges, would hunt for snowshoe-rabbits. When one was chased out of cover, the eagle would sweep down and make off with dinner. The trainees soon looked forward to the eagle's visit each day—an intriguing break in their workday.

Don Fredrickson, president of the Idaho Association of Soil Conservation Districts, with a hooded Saker falcon.

One of the most common misconceptions of birds of prey is that they are ruthless killers; they will attack anyone or anything without provocation. Falconers have known since the dawn of civilization that these birds are the most to be trusted among all wild creatures that are trained and used by man. Through the art of falconry men have come to know the probable actions of the raptorial birds. In the end, a strange sort of relationship develops in which the bird flies loose each day but prefers to hunt as a team with the falconer, instead of returning to nature by simply flying off to the closest cliff or mountain.

Trained birds of prey always return to a lure of some type, and they are fed and rewarded each time they obey a command of the falconer. From the beginning of training this philosophy is used. When fully trained, the hunting bird will either catch the quarry or return to the lure to try to hunt another time. When quarry is caught, the falconer must go back to his hunter, because quarry taken is usually too heavy for the hawk or eagle to carry.

One of the most interesting birds of prey that visits our northern tier of states is the gerfalcon from Canada and Alaska. These birds come down from their Arctic and subarctic

nesting grounds to visit the southern edges of Canada and northern United States during the winter only. Sometimes called "white rabbit hawks," or "winterers," they represent the largest species of falcon in the world. Highly prized by ancient and modern falconers, gerfalcons are the most powerful and capable falcon that can be trained for large quarry.

Practically all states have passed laws to protect the birds of prey, but in some cases they protect only the slow hawks and allow shooting of the falcons and accipters. This affords practically no protection since very few know the difference between the many species of hawks. A new law passed by the Idaho Legislature two years ago exemplifies the ideal approach to protection by law. In effect the law states that all hawks, eagles, and owls are protected except when in the act of destroying property. This puts the burden of control, when necessary, on the farm or ranch operators and stops indiscriminate shooting of beneficial hawks.

Laws alone cannot make a significant change in the pressure on birds of any type. With the raptorial birds there must also be an understanding of the relationship to agriculture and sportsmen. The combined efforts of sporting magazines, conservation clubs, and others are making headway, but time has almost run out on a few species of the birds of prey.

A hunting team in the ancient tradition: gerfalcon, dog, and the falconer (Morlan W. Nelson).

Gully Stopper

A 71-year old Wisconsin farmer comes out of retirement to stop the growth of a large gully that was bothering him.

By H. F. SMITH

FOR years Gust Fleckeisen worried about a big gully that crept ominously toward his barnyard and buildings. Gust had always taken pride in his weed-free vegetable garden and the flowers that he grew just west of the buildings. But every time he went out to work in the garden, or just to look at and enjoy, that gully spoiled everything. Not only was the gully causing serious damage, it was spoiling the appearance of the farmstead.

Gust doesn't have to worry about this gully now. He fixed it himself with a 24-inch drop-inlet structure and earth fill.

There's nothing unusual about this except that Gust is 71 years old and had quit active farming several years ago; but circumstances forced him to do this job and he proved he was up to it.

The cropland and the buildings of Gust's farm lie on benchland along the lower end of Waumandee Creek in Buffalo County, Wis. About 18 acres of Gust's farm drains right through the barnyard to the creek. The slope on this 18 acres is fairly steep, and the high runoff that occurs following heavy rains started the gully years ago.

In spite of all that Gust could do, the gully kept creeping toward the buildings—all the time getting wider and deeper. In 1950, he hired a bulldozer to fill it, but a "gully washer" rain in 1953, undid the work in a few minutes. After

Note.—The author is area conservationist, Soil Conservation Service, Eau Claire, Wis.

several other attempts to stop the gully with various methods of his own, Gust decided to build the pipe drop-inlet structure.

Being a cooperator with the Buffalo County Soil Conservation District was a big help. Gust got local Soil Conservation Service technicians on the job, and they designed a structure that would handle the gully once and for all.

The design called for a 24-inch reinforced concrete pipe that dropped the water 26 feet down through an earth fill to a safe outlet below the fill. A total of 74 feet of the concrete pipe was needed plus 23 cubic yards of concrete, 1,500 pounds of reinforcing steel, and a 20-foot section of corrugated metal pipe. The corrugated pipe was used as a propped outlet. It was extended beyond the fill to pour the water far enough downstream to prevent back-cutting.

Getting the job installed was the next problem. Gust first arranged with a local contractor to do the entire job in 1956, but the contractor was killed in an automobile accident before he started. Unable to locate another contractor, Gust decided to build it himself.

He hired a bulldozer to do the rough excavation work. A neighbor helped him dig holes and

Gust Fleickeisen checking the placement of concrete pipe used as outlet for gully control dam.

Drop inlet above completed gully control dam on the Fleckeisen farm.

set two 16-foot pilings which supported the propped outlet pipe. Gust did the excavating by hand for the drop inlet and pipe that went under the fill and made the forms and placed the steel. He hired a neighbor with a hydraulic-loader tractor to help place the heavy concrete sections of pipe and another neighbor helped pour the concrete. He hired another bulldozer and scraper to make the fill after he had first placed and tamped fill along the pipe by hand. It took 5,200 cubic yards of earth fill to complete the structure.

An engineering aide from the area SCS office supervised and guided the construction. After the machine work on the fill was finished, Gust worked over the entire area by hand, smoothing and leveling with shovel and rake. He then manured and seeded grass on the fill.

Gust now works in his garden in peace, almost hoping for a "gully washer"—because he knows his new soil conservation structure can handle it. An eyesore has been replaced by a smooth, grass-covered fill, doubly satisfying because he did much of it with his own hands.

Fleckeisen has lived on his 173-acre farm for 60 years. He now rents out the cropland and pastures 70 head of cattle for the neighbors on his creek bottoms. He keeps most of the cropland in hay.

Gust says one reason he built the dam is that he wanted to leave the farm in the best possible condition for the next owner.

Soil—Water—Wealth

A group of Montana farmers wanting to develop an irrigtion project found they needed to organize a soil conservation district and call on both State and Federal agencies to help them get the job done.

By O. LEON ANDERSON

MONTANA, in many ways, is a region of extremes. Though wealthy in soil and water resources, its lack of water at the right time often tests the most rugged farm or ranch operators with all of the problems inherent to the Great Plains. Montana has severe winters, hot dry summers, searing winds, flash floods, black blizzards, grasshoppers, and other catastrophes, at times.

The operators who have learned to "roll with the punch" find Montana a glorious State in which to live. This story is about a group of men who have learned the "art" and what they have done to bring soil and water resources together to produce new wealth.

Note.—The author is area conservationist, Soil Conservation Service, Lewistown, Mont.

Clarence R. Saylor, first chairman of the board of supervisors of the Petrolia Soil Conservation District.

Petroleum County, located just a little east of the center of Montana, is in the short grass country with an average rainfall of from 9 to 13 inches. Obviously, a drought in this county can really be severe. The drought over the Great Plains in the thirties didn't miss Petroleum County. From 1934 to 1940—7 consecutive years—the precipitation was below normal. Survival was a question. Many sold their ranches to the Government under the Federal land purchase program. However, there were others who stayed, and the men we write about in this story were among them.

For years they had watched the spring snowmelt from the Big and Little Snowy Mountains, some 50 miles away, flow past in Flatwillow Creek during the spring thaw. Then, before July they had seen the grass and crops shrivel and sear for lack of water.

Storage of this surplus snow water for later irrigation was the answer. The project, however, was too big for this group of men and too small for the U. S. Bureau of Reclamation; but was just right for the Montana State Water Conservation Board.

William Kruckeburg, State Water Board engineer, assisted by Clinton Hassett, of this group, located the site and made the first survey of the proposed storage dam in 1945. This site was at the junction of Flatwillow and Elk Creeks and provided a location where a large quantity of water could be stored with a minimum of yardage in the fill.

Before the project could be approved and money for its construction appropriated by the Montana Legislature, the drought was over, prices rose, prosperity returned. The dam proj-

Petrolia Dam that impounds 9,000 acre-feet of water.

ect was forgotten—or nearly so. Clinton Hassett, and others had memories, and they watched Big Snowy water roll past every spring.

Hassett did not let the water board forget. With frequent correspondence he goaded them about this project—the No. 1 project in the State to Hassett and others who remembered.

Finally the project was approved, and construction started on the dam on June 1, 1950. Construction work was substantially completed by July 1951. Meanwhile, the prospect of irrigation water for some 5,000 acres of Petrolia benchland changed from a nebulous idea to a clear concept. Beneficial use of this water, however, depended upon an adequate distribution system. Priority of development of land for irrigation depended on quality. The potential water users were aware of these basic facts. The need for technical information was recognized. More community action was in order. Clarence Saylor, William Welter, Ray Bohn, Leslie Thompson, and others decided to organize a soil conservation district.

The Petrolia Soil Conservation District was chartered on October 4, 1951. The first board of supervisors consisted of Clarence Saylor, Torger Sikveland, Ray Bohn, William Welter, and Isaac Iverson.

In the meantime, during the 1951 work season, under pressure from Saylor and Hassett, the area conservationist of Soil Conservation Service, they endeavored to meet the need for basic facts by: (1) Assigning the area soil scientist the job of surveying the irrigable soils to establish development priorities, and (2) setting up an engineering crew to develop a topographic map for use in planning the distribution system.

With these basic facts at hand, the board of supervisors, assisted by SCS technicians, set up the program of work. Marvin D. Hammarback was assigned as work unit conservationist. At the same time, Glenn R. Stucky, irrigation specialist for SCS in Montana, took over the job of planning the distribution system.

Working closely with the board of supervisors and the water users association, Stucky rapidly developed the plan. Fundamental features included provisions for border-dike irrigation, shallow surface drains to remove excess water, and a minimum of structures.

Land leveling started according to priority in the fall of 1951. Structures were built in order of need as rapidly as feasible.

The SCS work unit conservationist and work unit engineer were very busy keeping ahead of contractors and operators who were getting ready for irrigation in 1952.

The spring snowmelt in 1952 filled the dam to overflowing and more than 9,000 acre-feet of water were available for use that season. Water users made limited use of this water while working with feverish activity to prepare the land to receive it and the system to deliver it.

The State Water Conservation Board installed the main delivery canals of approxi-

Concrete drops that control erosion in an irrigation ditch on the Petrolia project.

mately 27 miles. The water users put in the smaller distribution laterals, both group and individual ditches, according to plan.

The project continues to develop. Water is sold at $4 per acre plus $1 for operation and maintenance. The approximate cost of the project was $450,000. All of this development was completed with the cooperation of the Agricultural Stabilization and Conservation Committee.

By 1956, 21 operators were irrigating 2,240 acres of highly developed land. This is not quite half of the area that will eventually be developed and placed under irrigation. However, it is more than enough to provide a contrast.

In the drought year of 1956, the healthy green of the irrigated alfalfa and grainfields produced outstanding evidence of the value of water when applied to good soil to produce new wealth. Harvested were yields of 6 tons of alfalfa hay per acre from 3 cuttings, 50 bushels of winter wheat, and 90 bushels of oats.

Irrigated pastures that have been seeded to tame grasses—mixtures of brome, fescue, orchard, whiteclover, and alfalfa—are being developed. More than three animal units per acre were carried last summer on newly developed pasture.

Land adjustments are occurring as a natural consequence. Owners in possession of more potentially irrigable land than they can conveniently use, are trading land to pay for leveling, or are setting up new farms for their sons.

The fear of liquidation is gone; so is the need of herd dispersal for lack of feed. Production stability is coming to Petrolia Bench.

IDLE WETLANDS HAVE VALUE.—There is good use for the hundreds of acres of wetlands, according to the Massachusetts Wetland Committee. It says there are 76 excellent economic and recreational reasons why the citizens of Massachusetts should take cognizance of this great natural resource.

The Massachusetts Wetland Committee is made up of Federal, State, and private agencies and organizations that are interested in the conservation and development of the wetlands. The objectives of the committee are: To assemble information on the factors influencing Massachusetts' wetlands; to provide technical assistance to individuals and organizations interested in the conservation and development of wetlands; and to inform the public as to the value of wetlands.

MORE WATER FOR THE CROPS

A group of Colorado farmers obtained one-third more irrigation water by lining their irrigation ditches with concrete.

By RALPH BURDICK

MANY farmers in the Arkansas Valley are finding ways of increasing the water supplies, available to their crops, by making better use of water that is turned through their headgates.

A group of six landowners south of Rocky Ford, Colo., report that they have one-third more water for use on their crops as a direct result of a concrete-lined ditch they installed.

Some of these water users figure one year's increased crop production from the improved water supply will pay for their share of the concrete installation.

The concrete structure is a 16-inch ditch 2,300 feet in length. It required 84 cubic yards of

Note.—The author is farm editor, Arkansas Valley Journal, La Junta, Colo.

Water users and SCS technicians inspect an irrigation ditch where one-third of the water seeps out to support only weeds and trees.

Concrete-lined irrigation ditch that gave users one-third more water for their crops.

concrete. The lateral serves a combined total of 255 irrigated acres representing 275 shares of High Line water among the six landowners.

Results are so satisfactory in this installation that the group plans to extend the concrete lining on more of the ditch next year. The present ditch represents about one-third of the total distance.

In previous years, a full hour and a half was required for the water to travel the 2,300 feet. Now it covers the distance in seven minutes.

One of the water users, Wallace Bishop, is on the lower end of the lateral. At least three hours elapsed from the time the water was turned into the lateral at the headgate until it reached his farm. When the head finally did twist its way around the many curves and through dense mats of weeds there was often no water left for Bishop's crops.

It is estimated that fully a fourth of the water in the ditch was being lost to seepage, weeds, and trees. Several large cottonwood trees were enjoying a healthy growth at the expense of this valuable irrigation water.

There is a vivid contrast now as trees and weeds are removed and curves straightened leaving a straight ditch for water to travel without obstruction. Although the concrete lining extends only one-third of the system, Bishop has been getting 2- to 4-hour runs of water. Furthermore, it reaches his place in about 1½ hours.

All water users on the system are realizing substantial benefits from the concrete installation. The Agricultural Conservation Program is providing assistance by paying a part of the cost. The remaining portion is being divided between landowners on the system by shares of water they own. Their cost is amounting to about $30.00 per acre of irrigated land.

The East Otero Soil Conservation District also provided important engineering services, available from the Soil Conservation Service, in constructing the ditch. It was installed by Valley Concrete of Rocky Ford.

In addition to Bishop, the other landowners using the system are Don R. Carroll, Esquivel Elrindo, George Santisteven, Walter Butler, and Gail Edgar. They are producing such crops as sugar beets, cantaloup, onions, alfalfa hay, and tomatoes. The additional water is a major factor in expanding production of all these crops for the six farmers.

Concrete erosion-control structures in irrigation ditch.

DISTRICT PROFILE

CASSIUS HARDY of NORTH DAKOTA

CASSIUS HARDY is a grain farmer and Aberdeen-Angus breeder who lives about 2 miles west of Ross, N. Dak. He has 1,610 acres in his unit, a portion of which was homesteaded by his father, Harry Hardy, in 1902. In the late 1930's, Cassius and his father became interested in conservation farming and helped organize the Two Creeks Soil Conservation District. Mr. Hardy has been on the board of supervisors of the district since it was organized and was, also, the first district cooperator. With the assistance of Soil Conservation Service technicians, Hardy has developed and is carrying out a plan of operations for a well-diversified unit.

He says: "A well-diversified farming enterprise is the principal type of agricultural operation that will survive in this area over a long period of years. The operation must be based on a complete soil and water conservation program to fully utilize each acre according to its capabilities."

He has constructed stockwater developments in each of his pastures. These mechanical practices, in conjunction with a pasture management program of proper stocking and deferred grazing, has resulted in better distribution of grazing and has kept his pastures in good condition. Mr. Hardy, also, has a tame grass pasture for early spring use that gives his native pastures a chance to develop a good growth before they are utilized. He says the stockwater developments have been a labor-saver because he formerly needed to water all of his livestock at the ranch headquarters.

A grass-legume rotation system is being carried out on his cropland. Two hundred and thirty-five acres of his tillable land are now in grass. At one time there was a wind- and water-erosion problem. Hardy says that the grass-legume rotation not only has checked his erosion problems, but has built up the organic matter in the soil that leaves it in a better condition to absorb moisture. The grass and legume mixtures are harvested as feed for his livestock.

The production of grass seed on his farm, in rows and solid stands, has given him a source of seed for his own use, as well as being a commercial source. He grows slender wheatgrass, bromegrass, intermediate wheatgrass, Russian-wildrye, and green stipa.

A farmstead shelterbelt has been planted on the north and west side of the buildings to protect them from wind and snow. He plans to plant a feedlot shelterbelt for his livestock, and field windbreaks for his cropland, to reduce evaporation in the summertime and to hold more snow in the winter.

Cassius Hardy.

The purchase of a sprinkler-irrigation system has enabled Hardy to utilize the water of deep sloughs to increase the production of alfalfa hay. He reports that the yield of alfalfa has doubled since he started irrigating.

Mr. Hardy is trying a new system of fertilizing whereby he applies ammonium nitrate to stubble ground in the fall, supplemented by phosphate the following spring. He states that in other areas of our country this has been tried with success, thereby reducing the need for summer fallowing so often.

Cassius Hardy is active in civic organizations. He is a director of the Production Credit Association at Minot, a past director of the North Dakota Aberdeen-Angus Breeders Association, and is a member of the National Cattlemen's Association.

—STANLEY VACHEL

Teachers' Workshop in Arkansas

By ELSTON S. LEONARD

THE first conservation education workshop in Arkansas was held at Arkansas State Teachers College, in Conway, July 1956. The Soil Conservation Service, State Forestry Department, and State Game and Fish Commission teamed up with the State Department of Education and the State Teachers College to make this project a success.

A Committee on Conservation Education was formed in December 1955, to study the needs in this field, to do long-range planning, and to promote the teaching of conservation in the public schools. The committee decided that teacher education was the greatest need.

From this point on, subcommittees from each agency worked with Dr. H. L. Minton of the college to outline what should be taught, who should teach, and how to use the teaching outlines that were developed.

Soil Conservation Districts assisted to insure an enrollment of at least 20 pupils. They offered $50 scholarships to pupils qualified and willing to take the course and become pilot teachers in their respective schools. Scholarships were also offered by county wildlife associations and wood products companies.

The instruction was divided into five areas: Soils, Water, Forests, Wildlife, and Minerals.

A soils man, an engineer, and an agronomist gave the instruction on soil and water the first 4 days of the three-week course. Ten specialists in the field of Forestry covered this subject in the next 3 days. Four specialists covered the field of Wildlife during the following 3 days. Dr. Minton was moderator and college repre-

Note.—The author is work unit conservationist, Soil Conservation Service, Little Rock, Ark.

Arkansas school teachers studying a soil profile under direction of the State soil scientist of SCS.

sentative in the course. He covered Minerals and coordinated all the other phases into a wel integrated program on conservation.

The student-teachers were divided into committees for each area of instruction for the purpose of evaluating and preparing material that will be distributed to schools throughout the State.

The college gave 3 hours of graduate or undergraduate credit and furnished a bus for field trips.

The course proved to be very popular with the students. The State Teachers College plans to conduct another workshop in 1957.

FERTILIZER WASTE IN APPLICATION. — Crop yields are directly affected by the way fertilizer is applied, according to tests made by soil scientists and agricultural engineers at Michigan State University. In muck soil tests, the researchers found that method of application made as much as 103 percent difference on onion yields and up to 50 percent on spinach yields. From the research, the scientists concluded that fertilizers for these 2 crops should be placed in a band 2 inches below the seed level or in a band 1 inch to the side and 2 inches below the seed level. If more than 800 pounds per acre of a fertilizer like 5-10-20 is to be applied with row spacing of 16-18 inches, the excess should be put on ahead of planting with a fertilizer grain drill, be broadcast on the surface, or plowed under.

SHELTERBELTS STOP SOIL LOSS.—William Carlin and his son Hubert in Sherburne County, Minn., put in a mile of shelterbelts along the west and north sides of the farm in 1942. Most of the jack pine, cottonwood, and red cedar trees are about 20 feet high now, and protect 160 acres of soil. "We can easily tell the difference," says William Carlin. "Years ago, there used to be a heavy cloud of dust blowing across the highway on windy days. Now we seldom see any soil blowing."

—The Conservation Volunteer, Minn.

PINES FOR PROFIT

(Continued from page 198)

Help is provided in making decisions on the long range land-use plan. The woodland farmers get assistance on the species to plant, the time to plant, and help in actual planting. Older pine is marked for harvesting and sold on a cutting-cycle system.

Yes, the cutover slums are going and gone. Where one professional forester worked in the county in 1939 many are active now, including 16 who are consultants or employed by industry.

McCurtain County, Okla. came out of the woods by growing more trees. Before, they farmed much of the wrong land. Now, their transgressions are being corrected gradually. It's an agricultural transition—in its more stable phase.

DIRECT-CUT SILAGE WASTEFUL.—The direct cut silage-making method isn't recommended for high moisture forage, according to recent research by University of Wisconsin farm engineers and dairy scientists.

They found that nearly half the total forage weight and more than one-eighth of the total dry matter was lost in liquids draining out of the silage.

The researchers cut legume-grass silage at less than one tenth bloom and put it directly into the silo. Moisture content of the fresh-cut forage was 86 percent as it went into the silo.

They collected the runoff from the silo pits and found that the runoff contained 13½ per cent of the dry matter put into the silo. This is an expensive loss of good proteins, vitamins, minerals, and energy.

Cutting forage early (at one-tenth bloom) is fine, the researchers say. But, it's also likely to have a high-moisture content, so it should be wilted before it goes in the silo.